

Description of the Data

Data used in this study are from USDA's Risk Management Agency (RMA), which maintains records of all individual farmers who buy federally backed crop-yield or revenue insurance. The data pertain to corn farmers in Iowa for the 1997 crop year. We selected a sample of about 60,000 unit-level insurance records for which 10 years of yield records were available.⁶ For each unit, we have several variables that describe the characteristics of the contract, such as choice of coverage level and price, premium rate, and indemnity payments. We also have variables that assess the risk of an individual unit—past yield records, yield span, farm practice, ownership share, loss frequency, and liability.

Tables 1 and 2 summarize descriptive statistics for the various insurance products based on the 1997 individual insurance records for Iowa corn and soybeans, respectively. In tables 1 and 2, we separate CAT and APH buy-up coverage contracts. The sample includes three yield insurance plans—CAT, APH, and GRP—and two revenue insurance plans—CRC and RA. IP is dropped from the analysis for lack of sufficient data. Only 50 IP contracts were sold for corn and soybeans combined in Iowa in 1997.

We calculated the mean and the coefficient of variation (CV) for each insured farm unit based on 10 years of yield data. The mean yields for corn ranged between

120 and 130 bushels/acre (table 1), while mean yields for soybeans ranged between 40 and 45 bushels/acre (table 2). The estimated CV of yield was around 30 percent for both corn and soybeans. We also estimated the CV of revenue for each farmer based on the 10 years of yield records and the marketing year average prices for the corresponding years. The CV of revenue follows the CV of yield closely across all products, even though one would have expected a lower CV for revenue because of the possibility of negative correlation between price and yield.

Results presented in table 1 indicate that CRC is the most expensive product on both a per-acre and per-dollar-of-liability basis. For example, corn CRC contracts cost an average of \$12 per acre or \$6 per \$100 of liability for a 65-percent coverage-level contract. The higher cost of CRC is due in part to higher expected indemnities, including provision for replacement coverage when the harvest-time price is greater than the projected planting-time price.

The loss frequency, calculated as the percentage of policies indemnified, for APH, CRC, and RA was, respectively, 1.4 percent, 2.1 percent, and 1.6 percent for the 65 percent coverage contract for corn in Iowa (table 1). The loss ratio, defined as indemnity paid out per dollar of premium, was 0.0543, 0.0514, and 0.0774 for APH, CRC, and RA for corn in Iowa, respectively. The loss-cost ratio, defined as indemnity paid out per dollar of liability, was also low for all insurance prod-

Table 1—Summary statistics for Iowa crop insurance contracts based on sample data: Corn, 1997¹

Characteristics	APH			CRC			RA			GRP	CAT
	65	70	75	65	70	75	65	70	75	All	50
Number of units insured	24,676	2,381	8,628	16,022	8,850	4,442	3,232	779	1,353	808	4,316
Average area insured (acres)	54.45	59.00	50.00	57.25	56.60	58.43	59.30	63.64	60.70	158.40	76.22
Mean yield (bu/ac) ²	126.02	127.34	123.52	125.80	127.20	124.90	128.00	130.33	128.76	123.00	129.40
CV of yield ³	0.31	0.31	0.32	0.31	0.31	0.32	0.30	0.30	0.30	0.21	0.33
CV of income	0.33	0.33	0.34	0.32	0.33	0.34	0.32	0.32	0.32	0.21	0.35
Loss frequency (%) ⁴	1.4	2.2	4.2	2.1	3.0	5.4	1.6	1.8	3.1	0.37	0.1
Premium rate (\$ per acre)	8.25	10.56	14.07	11.90	15.05	20.14	5.86	7.64	10.62	6.70	2.85
Rate (premium per \$ of liability)	0.0430	0.0501	0.0650	0.0581	0.0678	0.0864	0.0310	0.0361	0.0481	0.2000	0.0317
Loss ratio ⁵	0.0543	0.0544	0.1300	0.0514	0.0857	0.1397	0.0774	0.0660	0.1321	0.1290	0.0049
Loss-cost ratio ⁶	0.0030	0.0037	0.0091	0.0035	0.0091	0.0133	0.0034	0.0030	0.0066	0.0062	0.0007
Ownership share (%)	70	73	70	72	73	74	72	75	70	78	66
Average price elect (\$ per bu)	2.45	2.45	2.45	2.59	2.59	2.59	2.42	2.42	2.42	2.45	1.47

¹ Sample data consist of individual farm-unit level insurance records.

² For APH, CRC, RA, and CAT, mean yield is calculated for each unit based on 10 years of yield records, while for GRP the mean yield is calculated using county-level yield records.

³ CV is coefficient of variation (standard deviation/mean).

⁴ Loss frequency is the percentage of total policies indemnified.

⁵ Loss ratio is the indemnity paid out per dollar of premium collected (indemnity/premium).

⁶ Loss-cost ratio represents indemnity per dollar of liability (indemnity/liability).

ucts in 1997 (tables 1 and 2). The loss cost and loss ratios are low because insurance contracts in Iowa experienced lower claims in 1997 than in many other years largely due to favorable weather conditions and relatively high commodity prices. One should note that

these numbers reveal little regarding the long-term actuarial soundness of insurance products. The descriptive statistics for soybeans are similar to those for corn in 1997 (table 2).

Table 2—Summary statistics for Iowa crop insurance contracts based on sample data: Soybeans, 1997¹

Characteristics	APH			CRC			RA			GRP	CAT
	65	70	75	65	70	75	65	70	75	All	50
Number of units insured	18,263	1,269	7,359	10,484	4,840	3,451	2,143	408	811	782	4,198
Average area insured (acres)	48.80	53.30	46.33	52.17	52.08	55.40	53.82	57.70	50.32	118.13	69.50
Mean yield (bu/ac) ²	39.44	40.80	39.76	39.90	40.66	40.50	40.50	41.75	40.13	41.44	39.10
CV of yield ³	0.28	0.26	0.27	0.28	0.27	0.27	0.28	0.26	0.28	0.17	0.31
CV of income	0.29	0.27	0.28	0.29	0.28	0.29	0.29	0.27	0.28		0.31
Loss frequency (%) ⁴	1.4	1.4	2.6	1.8	2.4	4.3	2.0	1.0	1.0	0.0	0.1
Premium rate (\$ per acre)	5.04	6.25	8.30	7.06	8.92	12.20	5.30	7.40	10.00	3.00	1.73
Rate (premium per \$ of liability)	0.0314	0.0351	0.0451	0.0403	0.0468	0.0596	0.0297	0.0371	0.0496	0.0108	0.0230
Loss ratio ⁵	0.0406	0.0502	0.0987	0.3152	0.5554	0.8514	0.0637	0.0178	0.0420	0.0000	0.0062
Loss-cost ratio ⁶	0.0015	0.0022	0.0050	0.0174	0.0358	0.0541	0.0025	0.0008	0.0020	0.0000	0.0006
Ownership share (%)	0.68	0.71	0.68	0.70	0.71	0.72	0.70	0.71	0.66	0.75	0.66
Average price elect (\$ per bu)	6.15	6.15	6.15	6.62	6.62	6.62	6.64	6.64	6.64	6.15	3.69

¹ Sample data consist of individual farm unit-level insurance records.

² For APH, CRC, RA, and CAT, mean yield is calculated for each unit based on 10 years of yield records, while for GRP the mean yield is calculated using county-level yield records.

³ CV is coefficient of variation (standard deviation/mean).

⁴ Loss frequency is the percentage of total policies indemnified.

⁵ Loss ratio is the indemnity paid out per dollar of premium collected (indemnity/premium).

⁶ Loss-cost ratio represents indemnity per dollar of liability (indemnity/liability).